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# (54) Mineral cutting tools

(57) A mineral cutting tool assembly comprising a pick 10 having a cutting head 13 and a shank 18, a box 11 defining a socket, a sleeve 12 within the box socket and having mutually engaging tapered surfaces, and the sleeve being replaceably mounted by releasable fastening means 25, 26 in the box 11.

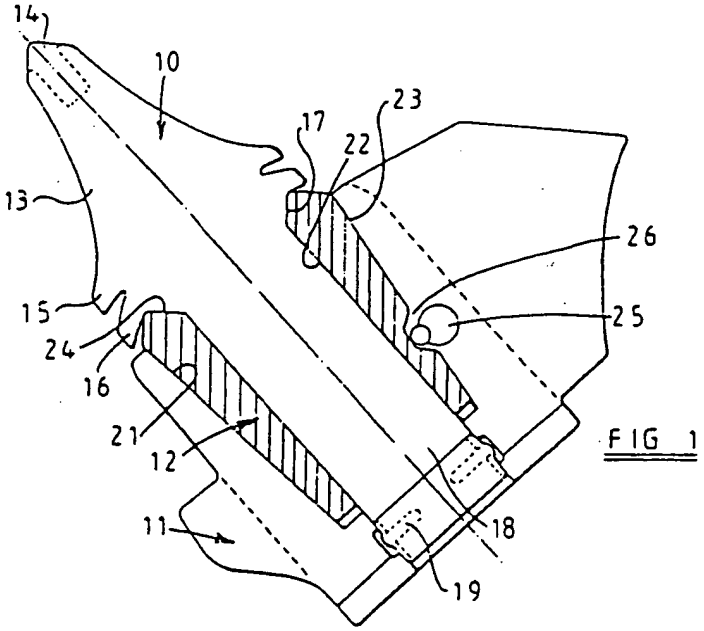


FIG 1

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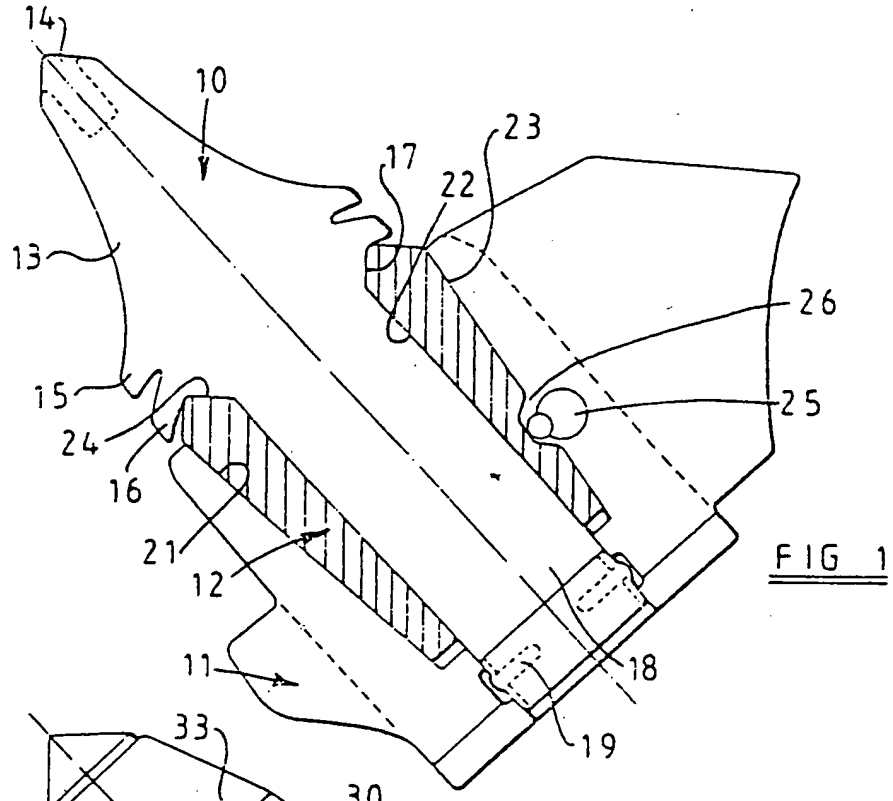


FIG 1

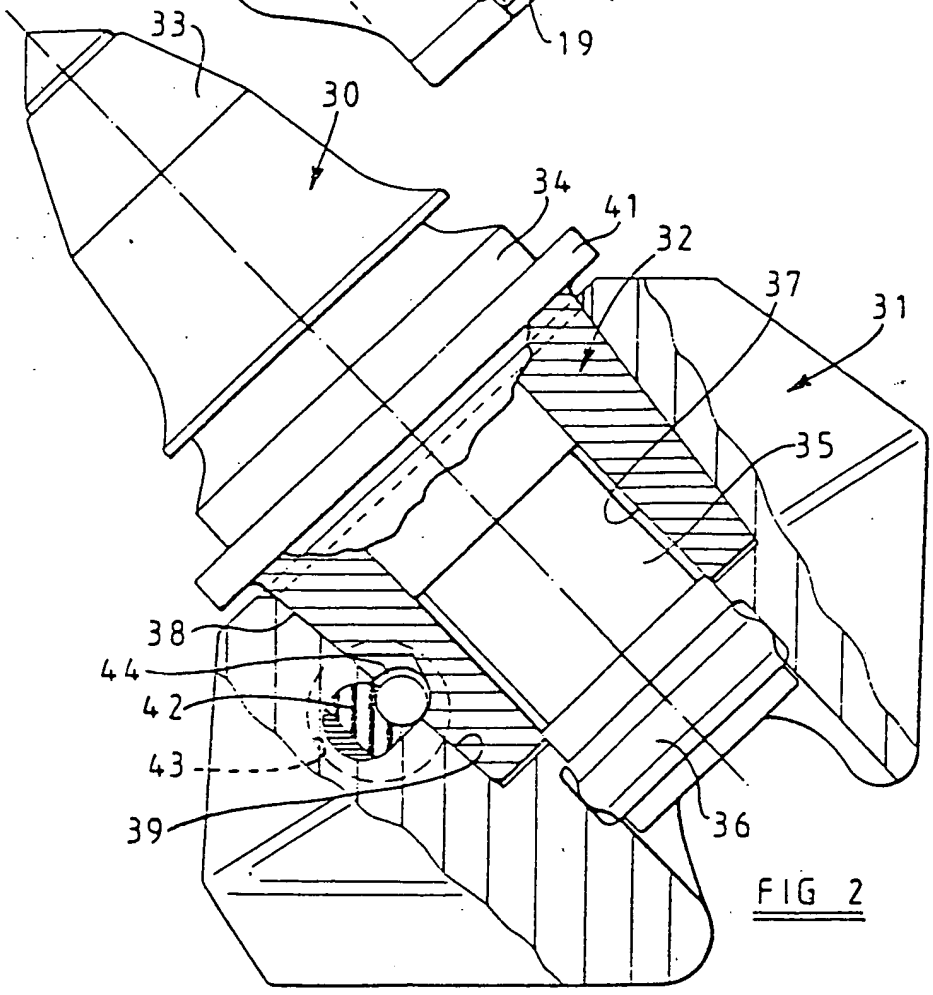


FIG 2

SPECIFICATION

## Mineral cutting tools

This invention relases to mineral cutting tools of she kind in which a pick is carried in a box, a number of picks and boxes being mounted on a drum, chain or osher apparatus. Normally the pick comprises a cutting head and a shank, which engages in a socket formed in the box.

Mineral cutting tools are used in an environment which contains much highly abrasive material, such as dust and small chippings and this results in very rapid wear of any surfaces where relative movement takes place, such as between the pick and the box.

Particularly on drum cutter assemblies, the boxes are secured, as by welding, to the drum and thus if wear has taken place in the socket formed by the box, the drum has to be withdrawn from service and, in deep mining, usually has to be brought to the surface for restoration and repair work to be carried out. For a drum to be out of service for any length of time, a high cost penalty is incurred.

Picks, on the other hand, can be changed underground, on site or elsewhere, since a releasable fastening means is provided to enable quick replacement to be carried out. Often, wear on the boxes renders simply replacing the picks unsatisfactory.

It has been proposed to insert a sleeve between the box and the pick, in order to minimise wear in the box. However, these have been used in conjunction with rotatable picks of the kind having a cylindrical section shank and the sleeve is also, at least in some cases, rotatable and of cylindrical section. The wear is therefore distributed between the pick and the sleeve and between the sleeve and the box. While this probably increases box life, it merely delays the need for box replacement.

It is the object of the present invention to provide a mineral cutting tool assembly in which box life is greatly increased and, furthermore, replacement of parts subjected to the greatest wear can be carried out underground, or on site or elsewhere, thus minimising the time during which the apparatus in out of service.

In accordance with the present invention there is provided a mineral cutting tool assembly comprising a pick having a cutting head and a shank and a box defining a socket, characterised in that a sleeve is provided within the box socket into which the pick shank engages, the sleeve end box having mutually engaging tapered surfaces, and the sleeve being held in the box by a releasable fastening means.

Preferably the arrangement is applied to a rotatable pick and the sleeve is of circular section but has a frusto-conical external surface to engage with a complementary surface in the box.

Conveniently, the sleeve is releasably secured in the box by a releasable fastening device, such fastening device being of the kind including a resilient element.

Preferably also, the angle of taper of the sleeve relatively to the axis of the pick is such that the sleeve and box will not become engaged by wedge action. A convenient angle of taper is 12°.

With this arrangement, it is possible to replace the pick and/or the sleeve, when wear between these has become excessive, without the need to replace the box. This replacement work can moreover be carried out underground, on site or elsewhere.

In accordance with a further aspect of the invention there is provided a box assembly for use in a mineral cutting tool assembly, the box assembly having a removable sleeve, the sleeve and box having mutually engageable tapered surfaces and the sleeve being securable in the box by a releasable fastening means.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view of a mineral cutting tool assembly constructed in accordance with the invention, and

Figure 2 is a cross-sectional view of an alternative mineral cutting tool assembly, in accordance with the invention.

The mineral cutting tool assembly shown in Figure 1 comprises a pick 10 mounted in a box 11, between which is a sleeve 12.

The pick 10, in this example, is of the kind including a cutting head 13 of generally conical or tapered form and having a hard metal cutting tip insert 14 mounted at its pointed end. This may be made from tungsten carbide. The head includes double flanges 15, 16 below the lower of which is defined an externally presented tapered surface 17. The pick includes a generally cylindrical shank 18, at the end of which is a clip indicated at 19, whereby the pick is held in place in the box 11.

The box, which is, in use, secured as by welding, in a drum or other assembly, has a bore 21 of tapered form over part of its length. At its inner end the bore has formations to engage the clip 19 used to secure the pick shank 18 in place.

Between the box bore 21 and the pick shank 18 is disposed the sleeve 12. This has a cylindrical interior bore 22 to accommodate the pick shank 18 and or externally tapered surface 23 to cooperate with the surface 21 of the bore of the box. One end of the sleeve is flat and the other end is chamfered both internally and externally. The internal chamfer 24 cooperates with the surface 17 of the pick flange 16 to provide a bearing surface for the pick, to accept end loading, in use.

To secure the sleeve 12 in the box there is

provided a fastening device 25 comprising a pin mounted in a resilient block of rubber. The pin locates in a recess 26 in the side of the sleeve 12. By means of a suitable tool inserted through a hole in the side of the box, the pin can be manipulated to allow the sleeve to be withdrawn or inserted.

In use, when wear takes place between the pick and the sleeve it is possible to replace the pick by the usual method of applying a lever under the flange 15 to extract the pick. Picks which have become excessively worn or damaged can thus be readily replaced in conventional manner.

If, however, it is found that there is excessive wear between the pick shank 18 and the sleeve 12 it is possible also to remove the sleeve 12 and to replace this with a new one, in addition to a new pick. This can be carried out quickly and easily using hand tools underground, on site or elsewhere. This avoids the necessity for replacement of boxes and this is particularly significant in that a drum or chain does not need to be taken out of service and taken to the surface for extensive repair work and down time is therefore minimised.

The construction shown in Figure 2 is an alternative type of pick and box assembly. This comprises a pick 30 mounted in a box 31 with an intervening sleeve 32.

The pick includes a cutting head 33 having a tip 33 of hard material such as tungsten carbide. The pick head is of stepped conical form and includes a flange 34 which locates it in operative position against the sleeve 32, as will be described. The pick also has a shank 35 of generally cylindrical form. Near its rear end, a groove contains a spring clip 36 of conventional kind whereby the pick is held in the box 31.

The box 31 is a generally rectangular or other shaped block which, in use, is secured in a drum or on a chain.

Between the shank 35 of the pick 30 and the box 31 is the sleeve 32. The sleeve has a generally cylindrical bore 37 and a tapered external surface 38 to accept the pick shank and to cooperate with a bore 39 of the box respectively. At one end the sleeve has a flange 41 against which the flange 34 of the pick engages, in use, a limited amount of movement will take place between the shank and the interior of the sleeve.

Preferably the angle of the taper of the surface 38 and of the complementary surface 39 of the box, relatively to the centre line of the pick is 12°. This is sufficient to prevent wedging engagement between the surfaces 38 and 39.

To retain the sleeve within the box there is a releasable fastening indicated at 42. This includes a pin mounted in a rubber block such that the pin can be deflected. The end of the pin extends through a hole indicated at 43 in the side of the box and can be manipulated by means of an appropriate tool. The sleeve 32 has a recess 44 to accept the pin of the fastening 42. The sleeve can be fitted by pressing it into the box, whereupon the pin is deflected until it reaches the position of the recess 44. The pin then snaps into the recess to take up the position shown in Figure 2.

## CLAIMS

1. A mineral cutting tool assembly comprising a pick having a cutting head and a shank and a box defining a socket, characterised in that a sleeve is provided within the box socket into which the pick shank engages, the sleeve and box having mutually engaging tapered surfaces, and the sleeve being held in the box by a releasable fastening means.

2. A mineral cutting tool assembly as claimed in claim 1 wherein the pick is rotatable relatively to the sleeve.

3. A mineral cutting tool assembly as claimed in either claim 1 or claim 2 in which the releasable fastening device by means of which the sleeve is releasably secured is of the kind including a deflectable element engaging a resilient block.

4. A mineral cutting tool assembly as claimed in any one of the preceding claims in which the angle of taper of the sleeve and of the bore of the box in which it is fitted, is such that the sleeve and box will not become engaged by wedge action.

5. A mineral cutting tool assembly as claimed in any one of the preceding claims wherein the pick has a surface engaging, in use, against an end surface of the sleeve, to form the primary load bearing surfaces therebetween.

6. A box assembly for use in a mineral cutting tool assembly, the box assembly having a removable sleeve having mutually engageable tapered surfaces between the sleeve and box, the sleeve being securable in the box by a releasable fastening.

7. A sleeve for use in a mineral cutting assembly as claimed in any one of claims 1 to 5.

8. A mineral cutting tool assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

9. A box assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

10. A sleeve for use in a mineral cutting tool assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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